

Unit 4 - Week 2

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How does an NPTEL online course work?
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Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-09-30, 23:59 IST.

1) The phase space dimensions of a system of N particles in three-dimensions is 1 point

- 6N
 3N
 9N
 2N

No, the answer is incorrect.
Score: 0

Accepted Answers:
6N

2) Equal a priori principle is valid only in 1 point

- Grand canonical ensemble
 Canonical ensemble
 Micro-canonical ensemble
 Isothermal-Isobaric ensemble

No, the answer is incorrect.
Score: 0

Accepted Answers:
Micro-canonical ensemble

3) Number of ways we can rearrange N number of adsorbed molecules on the solid surface having M number of lattice sites 1 point

a) $\frac{N!}{M!(N-M)!}$ b) $\frac{M!}{N!(M-N)!}$ c) $\frac{N!}{(N+M)!}$ d) $\frac{M!}{N!(N-M)!}$

- a)
 b)
 c)
 d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
b)

4) According to Stirling's approximation: 1 point

(a) $\ln N! \approx N \ln \left(\frac{1}{N} \right)$

(b) $\ln N! \approx N \ln N$

(c) $\ln N! \approx N \ln N + N$

(d) $\ln N! \approx N \ln N - N$

- a)
 b)
 c)
 d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
d)

5) Which of the following relations between pressure P and the micro-canonical partition function Ω , is true? 1 point

(a) $P = - \left(\frac{\partial \Omega}{\partial V} \right)_{E,N}$

(b) $P = -k_B T \ln \Omega$

(c) $P = k_B T \left(\frac{\partial \ln \Omega}{\partial V} \right)_{E,N}$

(d) $P = k_B T^2 \left(\frac{\partial \ln \Omega}{\partial V} \right)_{E,N}$

- a)
 b)
 c)
 d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
c)

6) For a free particle of mass 'm' with initial coordinate x_0, p_0 the equation of motion (i.e. with the progress of time 't') is 1 point

a) $x(t) = x_0$ b) $x(t) = 0$ c) $x(t) = x_0 t$ d) $x(t) = x_0 + \frac{p_0 t}{m}$

- a)
 b)
 c)
 d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
d)

7) Six distinguishable particles are distributed over three non-degenerate levels of energies 0, ϵ and 2ϵ . The total energy of the distribution for which the probability is a maximum, is 1 point

- 10 ϵ
 6 ϵ
 4 ϵ
 0 ϵ

No, the answer is incorrect.
Score: 0

Accepted Answers:
6 ϵ

8) A system of N non-interacting and distinguishable particles of spin 1 is in thermodynamic equilibrium. The entropy of the system is 1 point

(a) $Nk_B \ln 3$

(b) 0

(c) $3k_B \ln N$

(d) $Nk_B \ln 2$

- a)
 b)
 c)
 d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
a)

9) Consider two systems A and B each having two distinguishable particles. In both the systems, each particle can exist in states with energies 0, ϵ , 2ϵ and 3ϵ with equal probability. The total energy of the combined system is 3ϵ . Assuming that the system A has energy 3ϵ and the system B has energy 2ϵ , the entropy of the system is 1 point

(a) $k_B \ln 6$

(b) $k_B \ln 12$

(c) $k_B \ln 30$

(d) $k_B \ln 24$

- a)
 b)
 c)
 d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
b)

10) The entropy(S) of a system as a function its internal energy (E) is given by $S(E) = aE(E_0 - E)$ where a and E_0 are positive constants. The temperature of the system is 1 point

- zero.
 increases monotonically with energy.
 negative for some energies.
 decreases monotonically with energy.

No, the answer is incorrect.
Score: 0

Accepted Answers:
negative for some energies.